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ABSTRACT

This paper provides materials for a teacher workshop on the application of scientific processes across the curriculum. The approach is based on Taba's Inductive Model, and these materials contain sections on the purposes of Taba's model, teaching strategies used in Taba's model, the concept formation process, interpretation of data, application of principles, the scientific processes used in Taba's model, a planning guide to inductive thinking, an inductive thinking lesson that includes student handouts, a self-assessment check sheet for Taba's inductive model, and a coaching form for inductive thinking. (DDR)

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ED 411 163

Scientific Processes Across the Curriculum

A Workshop Presented at
The Joint Conference on Teaching Science and Mathematics
Little Rock, Arkansas
November 8, 1996

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The Purposes of Taba's Model

Or, Why Should I Teach This Way?

- Use of specific scientific processes
- Formation of concepts
- Attention to logic
- Sensitivity to language
- Awareness of the nature of knowledge

– Joyce, Weil, & Showers 1992

Teaching Strategies Used In Taba's Inductive Model

Remember That Much Maligned Federal Agency

- Concept Formation
- Interpretation of Data
- Application of Principles

The Concept Formation Process

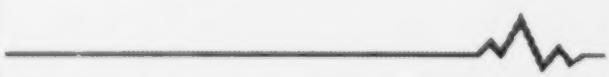
Remember to ShUSH (Shut Up Sweet Heart)

- Enumeration of the Data
- Grouping
- Labeling

Interpretation of Data

Moving Beyond the Data

- Identify Critical Relationships
- Explore Relationships
- Make Inferences



Application of Principles

Taking it to a Higher Level

- Hypothesizing, predicting
- Explaining and/or supporting the predictions and hypotheses
- Verifying the hypotheses/predictions

Scientific Processes Used in Taba's Model

You Mean We Can Do This Out of Science Class?

- Observing
- Classifying
- Inferring
- Predicting
- Verifying
- Communicating
- Inducing

Planning Guide
Inductive Thinking

A. TOPIC
What is the topic of the lesson?

B. DATA SET
What will the data be?
Who will be responsible for enumerating the data? (i.e. presented by the teacher, generated by students, etc.)

C. IS THE DATA SET VIABLE?
Can you see at least one logical classification scheme for the data set? Is there another way to group the same data?
What characteristics do you expect to be important in the classification process?

D. RULES FOR CLASSIFICATION
What is the minimum number of groups?
What is the minimum number of data per group?
What is the minimum number of attributes per group?
Is a miscellaneous group allowed?
Are there any groupings that will be forbidden? (i.e. "You may not group the data based on spelling or length of words.")

E. GOALS & OBJECTIVES
What is your emphasis for this lesson?
The emphasis could include, but is not limited to, any of the following skills/processes:
classification, inductive reasoning, observation, observational skills, identifying relationships, hypothesizing, making inferences, comparing & contrasting, constructing support, verifying hypotheses.
List one or two goals for the lesson.
List three or more behavioral objectives for the lesson.

F. WRITE THE LESSON PLAN

Indian Brides & Grooms

An Inductive Thinking Lesson

Subject Area: Social Studies
Strand: Cultural Anthropology

Grade levels: 4-12

Topic: Personal ads, marriage

Data set: Personal advertisements for spouses from *The India Times*

Instructional Goal: Students will utilize scientific processes in the study of anthropology

Performance Objectives: Students will

- Place the data into at least three categories
- List the attributes of each category
- Identify relationships between the data
- Generate hypotheses based on the data
- Develop tests for these hypotheses
- Verify these hypotheses

Note: This lesson may take from 2 - 4 class periods

Strategy 1 -- Concept Formation

Introduce the topic and tell the students the rules for classification. Relate to personal ads in the United States. "Have you ever read an ad in the personal section of the newspaper? I have a collection of personal advertisements from India. We are going to take a closer look at them today."

Form coop groups: use groups of four

Phase 1: Present the data.
Distribute data sets. Work as squares. Distribute induction matrices. One matrix for brides, one matrix for grooms.

Give examples of how matrices can be filled in using specific data from the ads.

Phase 2: Grouping. The students identify the categories to form, tally information into the matrix

Phase 3: Label (name) each group.
At least three groups
At least three pieces of data per group

Roles: 1 is recorder, 2 is reporter, 3 is gatekeeper, 4 is taskmaster.
Sponge activity: Write an ad for your ideal mate. Model it after these.
Have groups share their matrix categories.

Strategy 2 -- Interpretation of the Data

Phases 1 & 2: Identifying and Exploring critical relationships. Students identify and explore relationships between the data. These will include compare/contrast.

Graphic organizer: Venn (Brides/Grooms)

Questions to assist in this process are of the following type:

Can you see any ways in which all of your groups are similar?
Can you see any ways in which all of your groups are different?
Are there any characteristics that all your groups share?
Does one particular group appear to effect another group consistently?

Phase 3: Students make inferences.

Here you ask students to go beyond the data, find implications, and pull out deeper meaning.

What characteristics do Indian males seem to value?
What about the females?
Who do you think wrote these ads?
Who paid for them to be published?
Why do you think these persons are being advertised?

Strategy 3 -- Application of Principles

Phase 1: Students will be involved in predicting consequences, hypothesizing, or explaining unfamiliar phenomena.

What would happen if . . . ? (Marriages were not arranged; an ad like this appeared in a mainline US paper?; we were to analyze personal ads from the US?)
If we eliminate this item (or category) . . . , what do you think will be the result?

Phase 2: Students will explain or support their predictions or hypotheses.

Can you explain why you think that would happen?
Why does that seem to be a logical outcome to you?

Phase 3: Students verify the prediction.

Teacher asks students to construct support for their prediction. Ask questions such as the following:

How could you prove that to be true?
What would you need to know or need to know in order to show that to be true?

Do you know any sources you could consult to support your hypothesis?

Lesson Extension Write a personal ad for a US or Indian newspaper advertising your availability for marriage.

ADVERTISEMENTS FOR BRIDES

1. Wanted bride for Hindu boy (22), proceeding abroad, early marriage. No dowry, ring.

2. Suitable Sindhi bride preferably employed for handsome company executive (28/182 cms) with own house. No liability.

3. Match for 26/165 cms. graduate Singhal boy. Good personality, own business. Income in high four figures. Girl must be educated, really beautiful, slim, sharp featured and charming.

4. Wanted a tall beautiful, well qualified, sober girl for 26 year old Bengali Brahmin doctor. Please do not communicate without full details of girl at first instance.

5. Suitable bride wanted for Kastogi 27 yr. old businessman, earning in four figures, no demand.

6. Iyer Haritha Ayilyam, 35/152, steno seeks employed girl. Send horoscope details for early marriage to ....

7. Wanted a suitable bride for an IAS office, 28. No bars. Simiple early marriage.

8. Suitable, educated match for handsome Punjabi Khatri 27 yrs (184 cms), engineer, decently employed and highly placed in U.S.A. Girl's merit and family main consideration, marriage in India by December, no bars.

9. Wanted Sindhi beautiful, homely, educated, slim, tall, Manglik bride from reputed family for Sindhi smart, talented, Manglik boy (26, 178 cms, B.Sc.) engaged in family business comprising distribution of various consumer products. Reply with full particulars, horoscope.

10. Beautiful, fair, educated, homely girl for Jain Goyal handsome graduate civil engineer.

11. Match for Punjabi Brahmin, graduate boy (29/170 cms) running own factory in Delhi. Income high four figures.

12. Really beautiful convent educated for very handsome Punjabi Arora boy (28/175 cms). B. Com. diploma hotel management, presently working in Bahrain as assistant manager in five-star Gulf hotel getting 10.000.

ADVERTISEMENTS FOR GROOMS

1. Match for good slim girl, 28/162 cms., architect govt. service Simla non transferable. Early marriage.

2. Sindhi business family of repute invites correspondence for their highly talented, beautiful daughters, convent educated. Advertisement only for better choice.

3. Correspondence invited from well-settled self-dependent smart Gujarati Baniya boy for beautiful girl 22/157 cms. B. Com. English medium employed in Gulf.

4. Sindhi parents invite proposals from well placed engineers, doctors, executives for their daughter 26/157 cms. M.Sc., Ph.D., fair complexion, beautiful, good in household works.

5. Alliance invited from Lohana or upper caste youths for America settled 32 yet younger looking sharp featured Lohana girl.

6. Wanted Andbra Brahmin bridegroom for central government employed post-graduate girl of same community, 26 yrs. old.

7. Alliance invited for Gujurati Brahmin girl, 26/165 cms. M.A., good looking from enginer, doctor, company executive up to 30 years from same caste only.

8. Suitable match for Jain, beautiful smart girl 20/160, M.A. Little spot not visible at all. Respectable jewellers family of Western U.P. Decent marriage.

9. Wanted a suitable match for a good looking Ansari girl 162 cms, 22 years, M.A. with brilliant academic career. Caste, creed no bar.

10. Sindhi wanted service or business class person for pretty, homely, graduate girl, age 26, 160 cms.

11. Well settled, professional around thirty for fair, attractive, slim Iyer girl, 28/160. Only Iyer boys need respond.

12. U.P. boy for Delhi based girl, 22/160 cms, Lady Irwin B.Sc, M.Sc Home Science, using contact lens.

13. Suitable match (engineer, doctor, company executive) for charming, homely bride (22), 155 cms., convent educated. Only daughter of Kanyakubja Brahmin, father semior manager in a multinational company.

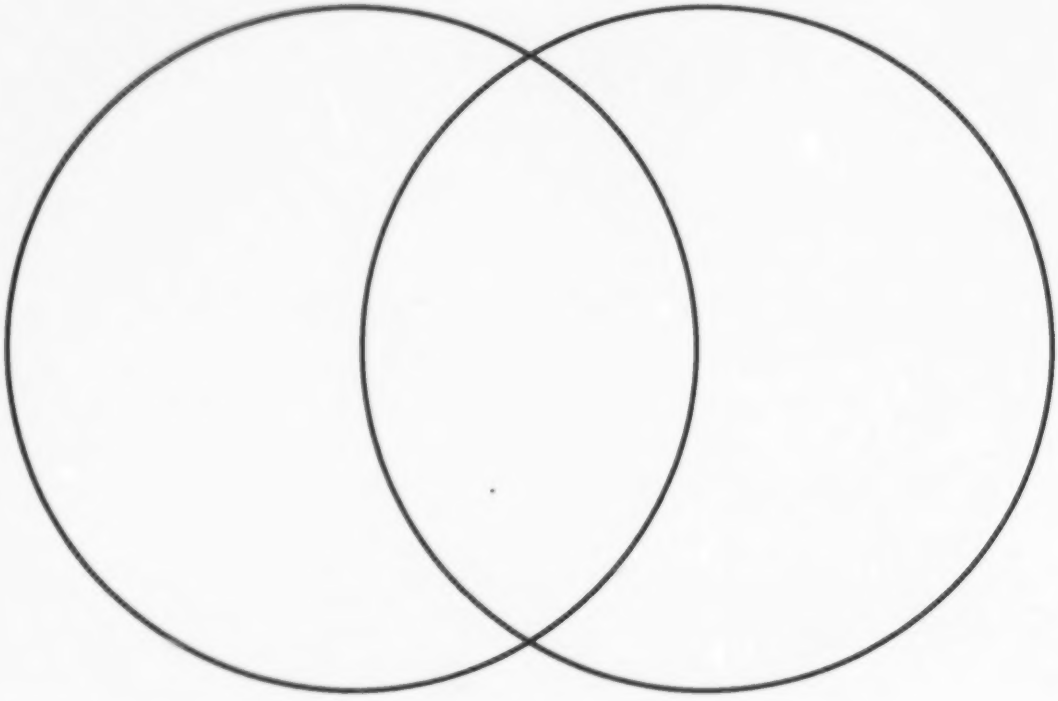
14. Wanted suitable match of about thirty years for Saraswat Brahmin girl drawing more than one thousand rupees per month.

Induction Matrix

Headings									Conclusions
Conclusions									

NAME _____ CLASS _____

VENN DIAGRAM



Coaching Form
Inductive Thinking

1. Describe the data set.

2. What instructions for classification did you give the students?

3. Describe the students' ability to form groups, identify attributes, and label each group.

4. Describe how the students identified and explored relationships?

5. How did you stimulate inferencing?

6. Describe the students' hypothesizing.

7. What do you think went well?

8. What would you like to do differently?

9. On the back of this sheet write a one paragraph self-critique. Include the following:

What part of this lesson seemed to be the hardest to teach?

What part of this lesson seemed to be the easiest to teach?

How do you know you reached your instructional goal?

Describe the students' reaction to this lesson.

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November 7, 1996

Self-Assessment Check Sheet for Taba's Inductive Model

Teacher_____ Observer_____

Instructional setting _____ Lesson topic_____

Strategy	Description of each phase	Competence level demonstrated			
		0 I Forgot It!	1 Tried It But It Flopped	2 It Went Pretty Well	3 It Went Great
1 Concept Formation	Focus statement				
	Data presentation				
	Grouping: # of groups, attributes/group, exemplars/group				
	Label groups				
2 Interpre-tation of the Data	Identify relationships: ie cause/effect compare/contrast				
	Explain relationships				
	Inferences about the data				
3 Application of Principles	Hypothesize/ predict				
	Explain/support predictions				
	Verify hypothesis				

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